

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY (Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference 72423PC/SH	FOR FURTHER ACTION See Form PCT/IPEA/416	
International application No. PCT/SE2004/001758	International filing date (day/month/year) 29-11-2004	Priority date (day/month/year) 29-12-2003
International Patent Classification (IPC) or national classification and IPC See Supplemental Box		
Applicant Atlas Copco Rock Drills AB et al		

1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of 6 sheets, including this cover sheet.
3. This report is also accompanied by ANNEXES, comprising:
 - a. ☐ (sent to the applicant and to the International Bureau) a total of _____ sheets, as follows:

☐ sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).
☐ sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.
 - b. ☐ (sent to the International Bureau only) a total of (indicate type and number of electronic carrier(s)) _____, containing a sequence listing and/or tables related thereto, in electronic form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).

4. This report contains indications relating to the following items:

- | | | |
|-------------------------------------|--------------|---|
| <input checked="" type="checkbox"/> | Box No. I | Basis of the report |
| <input type="checkbox"/> | Box No. II | Priority |
| <input type="checkbox"/> | Box No. III | Non-establishment of opinion with regard to novelty, inventive step and industrial applicability |
| <input type="checkbox"/> | Box No. IV | Lack of unity of invention |
| <input checked="" type="checkbox"/> | Box No. V | Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement |
| <input type="checkbox"/> | Box No. VI | Certain documents cited |
| <input type="checkbox"/> | Box No. VII | Certain defects in the international application |
| <input type="checkbox"/> | Box No. VIII | Certain observations on the international application |

Date of submission of the demand 12-07-2005	Date of completion of this report 22-11-2005
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INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.

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Supplemental Box

In case the space in any of the preceding boxes is not sufficient.
Continuation of: **Cover sheet**

E21B44/00 (2006.01)
E21B 21/08 (2006.01)

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.

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Box No. I Basis of the report

1. With regard to the language, this report is based on:

- ☒ the international application in the language in which it was filed
- ☐ a translation of the international application into _____, which is the language of a translation furnished for the purposes of:
- ☐ international search (Rules 12.3(a) and 23.1(b))
- ☐ publication of the international application (Rule 12.4(a))
- ☐ international preliminary examination (Rules 55.2(a) and/or 55.3(a))

2. With regard to the elements of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report)*:

- ☒ the international application as originally filed/furnished
- ☐ the description:
- pages _____ as originally filed/furnished
- pages* _____ received by this Authority on _____
- pages* _____ received by this Authority on _____
- ☐ the claims:
- pages _____ as originally filed/furnished
- pages* _____ as amended (together with any statement) under Article 19
- pages* _____ received by this Authority on _____
- pages* _____ received by this Authority on _____
- ☐ the drawings:
- pages _____ as originally filed/furnished
- pages* _____ received by this Authority on _____
- pages* _____ received by this Authority on _____
- ☐ a sequence listing and/or any related table(s) – see Supplemental Box Relating to Sequence Listing.

3. ☐ The amendments have resulted in the cancellation of:

- ☐ the description, pages _____
- ☐ the claims, Nos. _____
- ☐ the drawings, sheets/figs _____
- ☐ the sequence listing *(specify)*: _____
- ☐ any table(s) related to the sequence listing *(specify)*: _____

4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).

- ☐ the description, pages _____
- ☐ the claims, Nos. _____
- ☐ the drawings, sheets/figs _____
- ☐ the sequence listing *(specify)*: _____
- ☐ any table(s) related to the sequence listing *(specify)*: _____

* If item 4 applies, some or all of those sheets may be marked "superseded."

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.

PCT/SE2004/001758

Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	<u>1-21</u>	YES
	Claims		NO
Inventive step (IS)	Claims	<u>1-21</u>	YES
	Claims		NO
Industrial applicability (IA)	Claims	<u>1-21</u>	YES
	Claims		NO

2. Citations and explanations (Rule 70.7)

The invention concerns a method and a system for controlling power consumption during a rock drilling process and a rock drilling apparatus therefore. The rock drilling apparatus includes main power supply means for supplying power for the rock drilling process, which includes at least the sub-processes of percussion and/or rotation and flushing, the method comprising the steps of:

- adjusting the flush power at least partly as a function of hole dept, and
- controlling at least the percussion power and/or rotational power and the flush power such that the total power consumption of each sub-process is controlled.

The object of the invention is to solve the problem of controlling the power consumption during a rock drilling process in such a way that the power output of each sub-process is controlled so that the total power consumption is kept at or below a predetermined level.

Documents cited in the International Search Report:

D1: US 6637522 B2
D2: US 4793421 A
D3: US 5348106 A
D4: US 5121802 A
D5: US 3550696 A

Document D1 is considered to represent the closest prior art. D1 describes an apparatus and method for substantially continuously drilling and disposing of drill cuttings and dust to minimize airborne contamination while providing protection against overload using enhanced computer control.

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Supplemental Box

In case the space in any of the preceding boxes is not sufficient.

Continuation of: BOX V.

A flushing mechanism utilizes vacuum or pressurized water to create a bailing fluid flow for flushing the cuttings and dust from the drill hole for disposal. A transducer monitors at least one first parameter of the bailing fluid flow, and a sensor may also monitor at least one second parameter of a flow of a driving fluid under pressure for feeding the drill stem and bit into the earth. A controller is utilized to regulate the rate of feed and/or driving of the stem and bit dependent on the levels of the parameters being monitored.

The controller can be used to program and adjust the threshold level of the pressure corresponding to the approaching overload so that maximum drilling efficiency is obtained for any particular type of mining, or related operation, being performed. The window of operation is set to ensure substantially continuous drilling and eliminate false signals of approaching overload. The upper and lower thresholds of the gauge pressure in the flushing mechanism can be varied to establish the optimum rate of feed and/or drilling rotation. The object of D1 is to prevent that the overload causes a clogging of the flushing mechanism due to inability of removing drill cuttings fast enough.

The present invention differs substantially from D1 in that flush power is adjusted at least partly as a function of the hole depth, and that the percussion power and/or the rotational power and the flush power are controlled such that the total power consumption of each sub-process is controlled. In D1, however, the flush power is not controlled. In D1, one or more parameters regarding the flushing mechanism are measured, and if it is detected that the flushing mechanism is, or is about to be, overloaded the feed pressure (feed rate) and/or percussion pressure is reduced to allow the flushing mechanism to recover and return to normal flushing. Accordingly, clogging of the flushing mechanism is prevented, and the drilling process is optimised in the manner that it is not subject to undesired stops.

The invention defined in claims 1-21 is not disclosed by this document.

.../...

Supplemental Box

In case the space in any of the preceding boxes is not sufficient.

Continuation of: V.

The cited document D1 does not give any indication that would lead a person skilled in the art to the claimed method and system for controlling power consumption during a rock drilling process and the claimed rock drilling apparatus. Therefore, the claimed invention is not obvious to a person skilled in the art.

The cited documents D2 - D5 represent the general state of the art.

The invention defined in claims 1-21 is not disclosed by any of these documents.

None of the cited documents D2 - D5 give any indication that would lead a person skilled in the art to the claimed method and system for controlling power consumption during a rock drilling process and the claimed rock drilling apparatus. Therefore, the claimed invention is not obvious to a person skilled in the art.

Accordingly, the invention defined in claims 1-21 is novel and is considered to involve an inventive step.

The invention is industrially applicable.